Technical Exchange Reports

10 December 1997

TM Update

Dr. Richard Fujimoto

Administrative

- **TM meeting 21 Oct 1997**
  - **Wide Virtual Time**
- **Documents distributed**
  - **revised WVT document**
  - **FOM-based approach to WVT**
  - **dynamic federate topologies**
- **TM meeting 1 PM, 11 Dec 1997 (scheduled)**
  - **Wide Virtual Time (cont.)**
  - **Dynamic Topologies**

General philosophy:

- avoid rapid changes to IFSpec
- solicit feedback from the user community

Wide Virtual Time

Issue: federate controlled ordering of simultaneous events (events with the same time stamp)

Current Approach

- **federate asks to receive all simultaneous events**
- **receiving federate orders events**

Proposal: Wide Virtual Time

- **time values divided into multiple fields (e.g., hours, minutes, seconds); semantics of each field left up to federation**
- **low precision fields need not denote time units, but rather are used solely for the purpose of ordering simultaneous events**
- **RTI must be aware of time format to properly handle overflows within individual fields**
- **time format specified in FOM, RTI uses this description to synthesize comparison and addition operators**
- **does not preclude use of current, receiver-based approach**

Dynamic Federate Topologies

Federate topology: which federates can send messages to which other federates; can change dynamically (e.g., dynamic publication, DDM)

Issue: time management of changes in federate topology to ensure federates using logical time do not receive messages in their past

Current Approach:

- **semantics of operations changing topology based on wallclock time**
- **static topology OK; federate-level coordination needed for changes**

Proposal 1 (simple approach):

- **add time stamp parameters and impose lookahead constraints to certain operations (e.g., Register Object, Modify [DDM] Region)**
- **conservatively assumes any federate can send messages to any other**

Proposal 2 (connection lookahead):

- **enable exploitation of topology information by introducing a new type of lookahead for establishing new connections**

Current Status

- **continue evaluation of Wide Virtual Time approach**
  - **initial proposals did not take into account RTI must perform arithmetic on logical time values**
  - **current focus on FOM-based approach to specifying time format**
- **dynamic federate topology**
  - **discussions just beginning**
  - **anticipate recommendation some time away (experimentation and user community feedback needed)**

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Federation Management

Dr. Judith Dahmann

History of Federation Management

- **Tech Exchange (April 29, 1997)**
  - **Reviewed existing management mechanisms**
- **Tech Exchange (22 July 1997)**
  - **Continued review of existing management mechanisms**
- **AMG 20 (August 13-14,1977)**
  - **Reported progress on Federation Management**
  - **Agreed that the MOM would be in Interface Specification 1.3**
  - **Took action to begin work on MOM specification**
- **AMG 21 (October 8-9, 1997)**
  - **Initial analysis complete**
  - **Analysis ready for discussion and review by AMG community**

History of Federation Management

- **Tech Exchange (October 22, 1997)**
  - **Reviewed the analysis of the MOM**
  - **Generated draft recommendations**
- **Tech Exchange (November 14, 1997)**
  - **Reviewed recommendations**
  - **Recommended presentation of recommendations to AMG**
- **AMG 22 (December 10-11 1997)**
  - **Present summary of Federation Management recommendations**
  - **Conduct Tech Exchange to discuss recommendations in detail**

Federation Management Recommendations

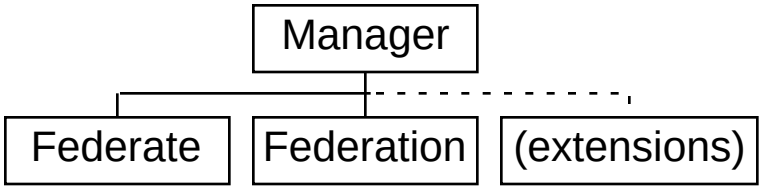
- Management Object Model (MOM) should be a separate section in Interface Specification 1.3
- Section should describe MOM with enough specificity to permit implementation
- Section should adhere to all conventions of the rest of the Interface Specification
- MOM should become an integral part of OMDT

Federation Management Recommendations

- The current capabilities of the MOM will be retained. Some aspects will be renamed for organizational efficiencies
- Several new attributes will be added to the object class that describes federate state (additional timing data, summaries of input and output activity, state save parameters)
- The class organization of MOM interactions will be changed so that four groupings of interactions will exist:
- The number of actions possible using the Manager.Federate.Service interactions will be significantly expanded. This will permit a manager federate greater flexibility in controlling a federation when anomalous circumstances arise.
- The amount of detailed information available to a manager federate will be significantly increased through interactions of class Manager.Federate.Report.
- Examples of this data are "number of interactions sent by a federate by class and transportation type" and "number of objects which a federate is updating at least one attribute by object class".

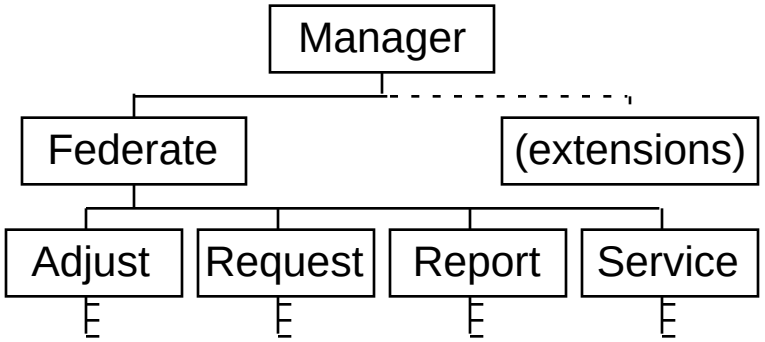
Federation Management Recommendations

- **Two MOM object classes**
  - **Generated by the RTI**
  - **Manager.Federate objects describe the state of each federate**
  - **Manager.Federation object describes the state of the federation**



Federation Management Recommendations

- **Four MOM interaction classes**
  - **Manager.Federate.Adjust interactions adjust the way the RTI performs when responding to a federate**



  - **Manager.Federate.Request interactions cause the RTI to generate Manager.Federate.Report interactions**
  - **Manager.Federate.Report interactions respond to request interactions, report RTI and Federate anomalies, and report service invocations for compliance testing**
  - **Manager.Federate.Service interactions invoke RTI services on behalf of another federate**